

SIMPLE ELECTROLYSIS BATH FOR CLEANING OLD COINS

NOTE: THERE IS A SKETCH BENEATH THESE INSTRUCTIONS

How does it work?

In layman's terms: A very low electrical current is circulated in the electrolysis bath, making the surface molecules of the coins vibrate. The vibration helps to shake off the dirt or at least to separate it from the coin's surface. **Always let the coins rest a moment when you take them out and use COLD water to clean them using a toothbrush.**

Sizes: 1" = about 2.5 cm so divide metric stuff by 2.5 for inches. No measurement is critical as long as everything fits.

What you need:

- 1.) A clean square, plastic ice-cream tub, Tupperware tub or 1 litre freezer container. Do not use anything made of metal.
- 2.) Two pieces of copper or brass tubing, diameter at least 5 mm, length = width of your plastic container plus about 4cm. Copper is preferable (conducts better).
- 3.) Some solid core copper cable, with plastic sleeve, cut to 2 pieces about 15-20 cm long, thickness at least 2mm. You can often get this from inside old cable from your local scrap yard.
- 4.) A piece of stainless steel, a bit shorter than the width of your plastic container. This is the most important item. Check that it is stainless steel, by testing it with a magnet. If it's magnetic it is not stainless steel, no matter how it is marked ! You can use a stainless steel knife, fork or spoon, use one you'll never need again, as it'll get ruined with time. Get some from a second hand shop, (take a magnet with you!)
- 5.) Some more solid core copper wire without the plastic sleeve. Length about 20 cm per piece, quantity 6 or 7. (These will hold the coins)
- 6.) Either a 4.5V torch battery or an unused 220 V AC adapter (110 V AC in USA) \Rightarrow to max 4.5 V DC battery charger (e.g from a mobile phone or similar). MUST have a DC output. Max 4.5 Volt, 1.5 mAmp (milliamperes).
- 7.) 2 pcs. electrical cable, eg from a car, with "bundled" core, about 50 cm (2ft) long.
- 8.) Other useful stuff: A couple of cable attachers (cable shoes, flat push-in type, or square sugar-cube type) to secure the ends of the battery charger wires or the battery poles to the copper tubing. A pair of pliers is handy for bending the copper core wire for holding the coins and stainless steel. You also need common washing soda (soda crystals) and warm water. Instead of - or in addition to the washing soda - you can use something called Natrium Hexametaphosphate (formula: NaPO_3) if you can get it from your local chemist.

Copper cable and wire can be found at a car breakers. Get enough of each.

We are only talking about 4.5 Volts DC here, like a torch battery. You can't get a shock from that, so you can't get a shock from this when it's rigged up.

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Refer to the sketch below for details.

Here we go:

- i) In the side walls of your plastic container (1), drill or cut 4 holes, two at each end. Each hole near a corner near the top and all the holes should be parallel to each other. The diameter of the holes should be such that you can push the copper or brass tubing (2) through them so they stick out about 1 cm on each side.
- ii) Remove the plastic sleeve from each end of the 2 pieces of automotive cable (7). Twist and fold one end of a cable and push it firmly (or solder it if you have a soldering iron) into one end of one of the pieces of copper tubing so it has a nice firm contact with

it. Now take the other piece of automotive cable and repeat the above with it and the other piece of copper tubing. So now you have two piece of copper tube each with a cable dangling out of one end.

iii) The other ends of your wires are going to be attached to your power supply, (the 4.5V torch battery or the battery charger). So you'll need suitable connectors. You can also clear the ends, twist them together and use insulating tape to protect them.

iiia) TORCH BATTERY: Use a cable connector on the end of the wire that just fit the poles of the battery, you may have to cut or bend the battery poles to make them a tad narrower to make it fit the cable shoes.

iiib) BATTERY CHARGER. Cut off the connector of the charger (the part that would go into the mobile phone or whatever) and press cable shoes onto each end. If you can already see which is + and - that's great, if not, no problem, it'll become obvious later. Then press the other halves of the shoe pair to the cables coming from the copper tube.

iv) Push the copper tubes through the holes in your plastic container so they stick out on each end (for stability).

v) Your piece of stainless steel (4) now needs to be connected to one of these tubes. e.g. by suspending it from it using one (or two) of the pieces of copper core wire (3). Must have a good contact. Bend the top end(s) of the copper wire over the copper tube. It doesn't matter for the moment which tube you use for this but mark the outer end of the container just below this tube with a + (plus) sign. This will be the "anode". (Aren't we learning a lot?)

Push the other tube through the other hole and mark it with a - (minus) sign.

vi.) Take the copper core wire (5). You'll be making something like matchstick men without arms. They'll have a bend at the top (to hang over the copper tube and two legs with bent-up feet, to hold the coins (see sketch below). The width of the legs can be adjusted to the size of the coin you'll be putting into it. Make them long enough to be about on the same level as the stainless steel. With trial and error you'll get it right. Make about 6 of these, perhaps a couple spare.

1 holder per coin. Don't use more than 6 or 7 per cleaning batch otherwise the resistance could be too much for your battery charger and it'll burn out inside. I first went through 3 battery chargers in a week using 9 coin holders at a time. Keep it at 4.5 volt max and 6 coins per batch and you'll be fine.

Note: The coins should NOT be able to touch the stainless steel !

So, get rid of the plastic sleeving on all the wire, cut them to the length required, bend the pieces of copper wire in half and twist them in the middle for stability. Bend the top end (inverted U shape) over, so it fits snugly onto the copper tube. and just fold the bottom ends upwards into V shapes to hold the coin.

vii.) Fill the container with warm water until the coin holder bottom ends and the stainless steel are immersed. Add 2-3 heaped teaspoonfuls of washing soda per liter or so. The soda must be fully dissolved. (I dissolve it separately and then pour the solution into the container and stir). Avoid using salt - salt will eat away any silver remaining on the coins and can destroy thin coins. I never, ever use salt.

viii.) Put the coins into their holders and hang them over the copper tube marked with the minus sign. If the coins are really crusty, try to clear a tiny section of the rim so the copper is showing. This helps the system to work.

ix) Connect the battery or charger to the two wires coming from the copper tubing and plug in.

x) Wait a few seconds and look into the container. You should see some bubbles being formed. Now, soda also works on the stainless steel so you may see that causing a fine white foam.

Where are the bubbles coming from?

If they're coming from the COINS, then that's CORRECT. Mark the connectors themselves + (stainless steel -tube-wire) and - (coin -tube-wire)

If they're coming from the STAINLESS STEEL, then the polarity is WRONG. Swap the wires over and mark the connectors + (stainless steel tube-wire) and - (coin tube-wire)

No bubbles at all, even after 1 minute ?

- a) it could be a faulty battery or battery charger. Test it using a multimeter and replace if necessary (note: torch batteries get emptied pretty quickly, in 2 hrs or so)
- b) Do your copper wire holders have enough contact to the copper tube?
- c) Is the electrical wire making contact with the copper tube?
- d) Test by using a multimeter on both copper tubes. Should show a reading of 3 or 4 V.
- e) Are you using real pure copper wire and not coated steel ? Steel and iron are amongst the worse conductors you can have. Brass is pretty close conduction-wise to copper, so brass is ok.
- f) Are you sure the anode IS stainless steel and not coated brass, or iron?
- g) Use a multimeter between the rods and check that you have voltage. Also check the ohms (by switching your multimeter to the Ω or Ohm setting) between 2 coin holders on the rod and between the coin holders and the rod itself. (low ohm reading or 00.00 means everything is connected ok)

Important: Avoid cleaning silver coins together with bronze or copper coins. You can destroy silver like that. Put silver coins into lemon juice for 5 minutes to clean them, then rinse them well in cold water, using a toothbrush to clean them.

The coins will begin to give off little bubbles. Using soda these bubbles will be scarcely visible. The coin surfaces begin conducting electricity and the electrons on their surfaces are vibrating, loosening the dirt.

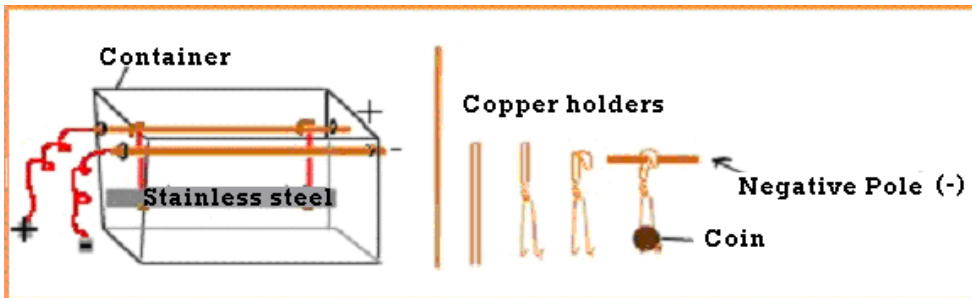
Leave them in the solution for about an hour. Check them after half an hour and rinse them in cold water and give them a brush with a cut-down toothbrush. Do not use anything else besides cold water, as the surface molecules have not fully come to rest and you can destroy the patina if you use e.g. washing up liquid. Replace them if they need a bit longer. You can also rotate them in their holders. If nothing has happened, you can scrape a bit of dirt from the rim of the coin to clear some metal then replace it into the bath.

Don't worry if the water turns dark. The outer coating of the holders is removed by the process, revealing the copper core, so don't worry if the holders have changed colour when you take them out. If the ends of the wire turn black or green, clean them with a wire brush to ensure that contact to the rods remains intact.

This works really great, no more scrubbing, no more accidentally damaging coins using the wrong equipment (after the electrolysis, I use a binocular microscope with dental tools. Dentists need to replace instruments now and again, so ask your dentist to put his steel picks and microdrills etc to one side for you instead of throwing them away).

Note: In time you may have the feeling that your electrolysis bath is not working properly any more. The copper wire parts may rot, so clean with a wire brush or replace them.

- Clean the copper tubing with a piece of emery or sand paper.
- Clean the ends of the stainless steel holders or replace the holders (corrosion may be inside the sleeve where you can't see it)
- Give the "coin" ends of the coin holders a once-over with a steel brush to ensure good contact.



Have fun and best wishes from Switzerland
Dane ("Helvetica") Kurth